

Submission for Workshop on Advanced Collaboration Environments

The New World Window: Using Images instead of Data to Collaborate

Thomas Myers, Bill Bartling, Dr. Eric Frost, Alex Lightman of Charmed Capital, PLC.
tm@sunreyes.com

ABSTRACT:

Imagine a world, where researchers can interact with and view 100's of terabytes of data securely stored 10 thousand kilometers away in real time; where multiple doctors can collaborate on the same CT file in multiple locations simultaneously while video conferencing with each other; where culture can be shared in real time between developing nations and the western world in full resolution, all without the movement of any data? Now imagine this being done in full stereographic vision up to 120 Hz. on multiple screens synchronized together. New technologies in audio/video delivery, interactive bi-directional controls, and broadband communications have allowed us to bi-directionally communicate at 10's of Gigabits per second using communications technologies that are available today. This paper will explore the technologies we have developed in our labs and with our partners and the successes we have experienced.

THE APPLICATION

Decision makers and technical experts are often far from important operation sites, such as oil rigs and remote mining sites. Critical events at these sites can occur at any time. By linking remote sites to corporate centers and headquarters, those most qualified can receive the information they need to make high-quality, informed decisions. In short, the right decision

can be made by the right people at the right time.

Traditional links with voice, data and text are good, but inadequate for providing an on-site experience. Video conferencing links add sight, but are inadequate for providing an on-site experience.

The solution is visualization. By immersing the decision makers and technical experts in a high-resolution, stereo 3-d environment with top-quality audio, key individuals are empowered with detailed and rich information, making optimum advantage of the human-machine interface. By adding voice and control links back to the remote site, the off-site individuals can control the view, activate remote processes, and give orders and directions to the on-site crew. Remote visualization is the next best thing to being there.

VIDEO DATA RATES

If we consider an SXGA screen (1280 x 1024 pixels) at 24-bit color and 96 frames per second, we find that the data-rate is over 3 gigabits per second. Such a data rate cannot be handled by a single channel of Gigabit Ethernet, let alone by a practical, cost effective link to a truly remote site. A simple solution is to drop frames at the sending side and replicate the acquired frames at the receiving side. This can reduce the data rate by a factor of 10 or even 20 to 1, but the result is a jerky video image, which is fatiguing and detracts from the immersive experience. But even at a 20 to 1 reduction in bandwidth,

the data-rate is over 150 Mbps. The end result is poor quality at high cost.

A superior method is to use advanced video compression techniques to reduce the data-rate, while maintaining the best possible quality. In the future, implementations of MPEG-4 and H.26L codecs will provide the best available compression techniques. Unfortunately, these standards are currently limited to software implementations, which do not operate in real-time. The best commercially available compression solution available today is MPEG-2, which is the basis for digital satellite, digital cable and digital terrestrial television.

MPEG-2, when applied to today's HDTV digital broadcasts have a compression ratio of roughly 70 to 1. Theoretically, that gives us 43 Mbps, which fits nicely within an optimum 45 Mbps channel.

This paper will explain in more detail how bi-directional transceivers will work at efficiently filling a pipe that can work with various data transmission technologies.

THE SIGNAL CHAIN

The conversion of the image output of the computer, the audio output from any source, the audio input for bi-directional communication and control inputs and outputs, has been condense to a simple chain of events with each transceiver to bring full control of any source at any location around the world.

This paper will demonstrate how this is done, the test results we have found and where this technology is headed for the future.

DATA TRANSMISSION

Data transmission can be done over fiber, copper, wireless or satellite signals with this technology. However, the most efficient technologies work with IPv6 and "4G" wireless technologies that will define broadband communications over the next 10 years.

Today IPv6 is already being recognized as a standard in intelligence and military operations, and has one overwhelming support with researchers. This paper will explain more how we can utilize IPv6 and 4G wireless to minimize the latency and delays in current communication channels.

CONCLUSION

This leapfrog in technology is only the first step in a chain of events that will take place to bring the window of the world to anyone in real time. This goes beyond HDTV into a new realm of reality that can be seen in stereographic reality centers today and at your desktop tomorrow.

About the Authors:

Tom Myers has held executive positions in companies working within the video, visualization and communications industries. The founder of two companies that have specialized in visualization communications and collaboration, Tom has develop many patent technologies that today are used in visualization centers around the world. Tom also has multiple patents in the standard definition and high definition video world and has won a technical EMMY award for his work in 3D effect engines. Other bios and better detail to come with the paper.

Phone: (760) 443-1513